Incidence of Hand Eczema—A Population-Based Retrospective Study

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When etiological relationship is of interest, the incidence rate is a preferred measure. The aim of the present retrospective study was to estimate the incidence rate of self-reported hand eczema in a sample from the general population and to study the relation of this to age, sex, and atopy. A questionnaire was mailed to 3000 individuals aged 20–65 y, randomly selected from the population register of Göteborg, Sweden. This gave a response rate of 73.9%. Questions were asked about ever having had hand eczema, time of onset of the disease, history of childhood eczema, and history of asthma/hay fever. The crude incidence rate of self-reported hand eczema was 5.5 cases per 1000 person-years (females 7.1 and males 4.0). There was no difference, however, in incidence rate between women and men above 30 y of age. In a Poisson regression analysis, female sex, childhood eczema, and asthma/hay fever were all significantly associated with hand eczema, but only at ages below 30 y. A moderate influence of recall bias and a probable tendency to underreport imply that the incidence rates presented are to be considered as minimum rates.

Key words: atopy history/epidemiology/general population/relative risk/recall bias
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The occurrence of hand eczema, which is the most frequent occupational skin disease, has usually been investigated in cross-sectional studies where the results are presented as point prevalence or period prevalence (Menné *et al*, 1982; Coenraads *et al*, 1983; Kavli and Förde, 1984; Lantinga *et al*, 1984; Yngveson *et al*, 1998, 2000; Bryld *et al*, 2000; Meding *et al*, 2001; Mortz *et al*, 2001). In the general population of Göteborg, Sweden, the self-reported 1-y period prevalence of hand eczema was 11.8% in 1983, and 9.7% in 1996 (Meding and Järvholm, 2002).

To study the occurrence of a disease, an alternative is to focus on new cases, i.e., to study the incidence rate in a prospective or retrospective longitudinal study. This procedure is superior to prevalence studies if etiological relationship is of interest, e.g., to compare the risk of disease in relation to different risk factors (Rothman and Greenland, 1998). The incidence rate has been studied in a few reports (Table I). A retrospective study design has been used on a sample from the general population (Lantinga *et al*, 1984), and in nurses (Smit and Coenraads, 1993) and bakers (Brisman *et al*, 1998). A prospective study design has been used in studies involving apprentice hairdressers and apprentice nurses (Smit *et al*, 1994), in hairdressing apprentices (Uter *et al*, 1998a), in office apprentices (Uter *et al*, 1998b), and apprentices in the car manufacturing industry (Funke *et al*, 2001). From occupational-disease registers in Germany, incidence rates regarding occupational skin disease have been reported (Tacke *et al*, 1995; Dickel *et al*, 2001, 2002). An overall incidence rate of 68 cases per 1000 workers per y was reported in the Saarland for the years 1999–2001 (Dickel *et al*, 2002).

An increased risk of hand eczema has been shown in several studies in individuals with history of skin atopy (Nilsson *et al*, 1985; Rystedt, 1985; Lammintausta *et al*, 1991; Coenraads and Diepgen, 1998). In a prevalence study of hand eczema in the general population of Göteborg, a history of childhood eczema was identified as an important predictive factor for hand eczema (Meding, 1990). A prevalence ratio of about 3 was found when comparing 1-y prevalence in individuals with or without a history of childhood eczema. Results in studies regarding respiratory atopy as a risk factor for hand eczema are, however, not unanimous.

The present aim was to estimate the incidence rate of self-reported hand eczema in a sample from the general population and to study the relation to age, sex, and atopy.

Results

The cumulative self-reported prevalence of hand eczema ("hand eczema ever") was in total 17.4% (386 of 2218): for females 21.8% (246 of 1130) and for males 12.9% (140 of 1088) ($p < 0.001$). Thirty-five percent of the female cases and 27% of the male reported onset of hand eczema before the age of 20 y. The crude incidence rate of self-reported hand eczema was higher for females than for males (7.1 and 4.0 cases per 1000 person-years, respectively) (Table II). The incidence rate of hand eczema in relation to sex and age at onset is shown in Fig 1. The highest incidence was found in females aged 20–29 y.

Table I. Incidence rate (cases per 1000 person-years) of hand eczema in different studies

Type of study	Study population	Incidence (per 1000)	Reference
Retrospective	General population	7.9	Lantinga *et al* (1984)
Retrospective	Nurses	78	Smit and Coenraads (1993)
Prospective	Hairdressing apprentices Nurses apprentices	328 145	Smit *et al* (1994)
Retrospective	Bakers Population controls	m 16.7; f 34.4 m 4.4; f 11.3	Brisman *et al* (1998)
Prospective	Hairdressing apprentices	152	Uter *et al* (1998a)
Prospective	Office apprentices	41	Uter *et al* (1998b)
Prospective	Car industry apprentices	47	Funke *et al* (2001)

Table II. Incidence rate of self-reported hand eczema (cases per 1000 person-years) in relation to sex

	Cases	Person-years	Incidence (per 1000)	95% CI
Males	127	32089.5	4.0	3.3–4.6
Females	227	31833.5	7.1	6.2–8.1
Total	354	63923.0	5.5	5.0–6.1

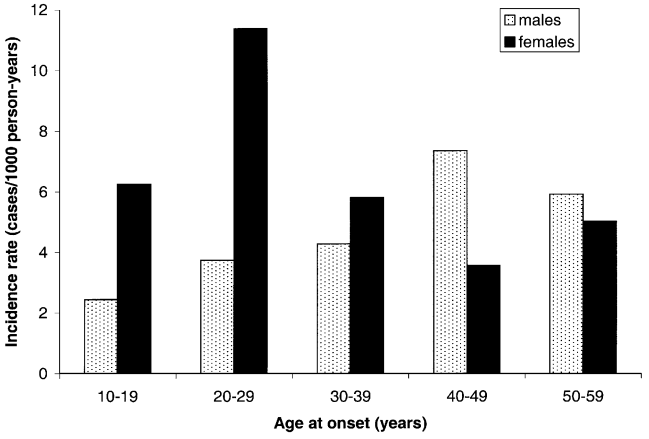

Figure 1
Incidence rate of self-reported hand eczema (cases per 1000 person-years) in relation to age at onset and sex.

In total, childhood eczema was reported by 12.4%, asthma by 9.1% and hay fever by 24.5%. Of hand eczema cases with onset before the age of 20 y, 63% reported a history of childhood eczema. The incidence rate of self-reported hand eczema in relation to atopy history and age at onset of hand eczema is shown in Table III. Both history of childhood eczema and asthma/hay fever were related to an increase in the incidence of hand eczema in younger ages, while in the age group 30–65 y there was no influence of atopy history. The highest incidence, 46.8 cases per 1000 person-years, was in females aged 20–29 y with histories of both childhood eczema and asthma/hay fever.

The incidence rate of self-reported hand eczema in relation to reported first year of illness is presented in Table IV. The figures were highest for onset of the disease during the previous ten years, indicating that onset far back in time may have been forgotten by some of the responders.

A Poisson regression analysis was performed separately for the age groups 10–19, 20–29, and 30–65 y (Table V). Sex, history of childhood eczema, and asthma/hay fever were all significantly associated with hand eczema in the two youngest age groups but none of these parameters were significant at age 30–65 y.

Discussion

Several prevalence studies have found that a history of childhood eczema is associated with hand eczema, but this incidence study indicates that there is only an association at ages below 30 y. The risk in different ages is hard to study in prevalence studies as the prevalence is depending on duration of disease. The overall incidence rate of hand eczema was 5.5 per 1000 person-years in this study. This is lower than the incidence rate in the study by Lantinga *et al* (1984), which is the only other study of incidence rates of hand eczema in the general population we have found (Table I).

Females had a higher incidence rate of hand eczema than males, the overall female/male ratio being 1.8. In cross-sectional studies, a higher prevalence of hand eczema has also been observed in females (Coenraads *et al*, 1983; Kavli and Förde, 1984; Lantinga *et al*, 1984; Bryld *et al*, 2000; Yngveson *et al*, 2000; Meding *et al*, 2001; Mortz *et al*, 2001). In a German study, female predominance of occupational skin disease in young age groups has been presented (Dickel *et al*, 2002). The present study indicates that the only difference in hand eczema risk between males and females is for ages below 30. We have found no other study where the age at onset has been adjusted for, when comparing risks between males and females. Prevalence

Table III. Incidence rate (cases per 1000 person-years) of self-reported hand eczema in relation to age at onset and atopy history in males and females

	Incidence (per 1000)					
	Males: age at onset (y)			Females: age at onset (y)		
Atopy history	10–19	20–29	30–65	10–19	20–29	30–65
No atopy	1.2	2.3	5.1	2.9	7.8	4.3
Asthma/hay fever, no childhood eczema	1.6	5.1	6.7	4.8	12.5	6.3
Childhood eczema, no asthma/hay fever	13.6	7.4	5.1	13.6	25.1	6.3
Childhood eczema and asthma/hay fever	19.6	24.5	7.4	36.0	46.8	5.4
All	2.4	3.7	5.5	6.3	11.4	4.8

Table IV. Incidence rate (cases per 1000 person-years) of self-reported hand eczema in males and females in relation to first time of illness

	Incidence (per 1000)					
	Age at onset 10–19 (y)		Age at onset 20–29 (y)		Age at onset 30–65 (y)	
First time of illness	Males	Females	Males	Females	Males	Females
Previous 10 y	7.9	15.3	7.0	17.5	7.5	6.5
Previous 10–20 y	3.3	10.9	4.4	13.6	4.0	4.0

Table V. Poisson regression analysis of hand eczema by sex, history of childhood eczema, and asthma/hay fever analyzed separately for the age groups 10–19, 20–29, and 30–65 y

Parameter	Coefficient (95% CI)	RR (95% CI)
Age at onset 10–19 ys		
Sex[a]	0.69 (0.23–1.14)	2.0 (1.3–3.2)
Childhood eczema	1.97 (1.54–2.39)	7.2 (4.7–11.0)
Asthma/hay fever	0.62 (0.20–1.04)	1.9 (1.2–2.8)
Age at onset 20–29 y		
Sex[a]	1.04 (0.64–1.42)	2.8 (1.9–4.1)
Childhood eczema	1.29 (0.90–1.68)	3.6 (2.5–5.3)
Asthma/hay fever	0.62 (0.27–1.85)	1.9 (1.3–2.6)
Age at onset 30–65 y		
Sex[a]	−0.14(−0.49–0.21)	0.87 (0.61–1.24)
Childhood eczema	0.11 (−0.61–0.84)	1.1 (0.54–2.31)
Asthma/hay fever	0.30 (−0.08–0.69)	1.4 (0.92–1.99)

[a]Females *versus* males.

studies are for obvious reasons inappropriate for studying the age at onset. In a previous prevalence study (Meding, 1990), a higher prevalence of hand eczema was found in females than in males in all age groups, probably due to the long duration of the disease. An age of 20–29 y is a period in life when many women, besides occupational exposure, also have skin irritant exposure to their hands from wet work in the home, including taking care of small children. This may be an important reason for the difference in occurrence of hand eczema between men and women. Furthermore, young women have more exposure to wet work in their early working life than men, e.g., between 19 and 29 y of age, 37.5% of females and 18.2% of males reported having occupational water/skin contact several times an hour (Statistics Sweden 1997).

The incidence of hand eczema found in different studies is highly variable (Table I), for which there are probably several concurrent reasons. One important explanation is difference in sensitivity and specificity for the methods used. In a study of the validity of self-reports of hand eczema, the sensitivity was rather low (53%–59%), but the specificity high (96%–99%) (Meding and Barregård, 2001). The underreporting is to be expected in retrospective questionnaire studies (low sensitivity), and gives an underestimation of the true incidence of hand eczema. A low specificity, however, can overestimate the incidence rate, especially in rare diseases the overestimation can be large if the specificity is low. In contrast, both high sensitivity and high specificity are probable where hand eczema is diagnosed by clinical examination in prospective studies.

To be able to compare the incidence rate found in different studies, it is also important that only new cases of hand eczema (not recurrent cases) are included. As expected, the incidence is high in occupations such as hairdressing and nursing with harmful occupational skin exposure. The highest incidence rates were observed in Smit *et al* (1994) and Uter *et al* (1998a). Both are prospective clinical studies with short-term follow-up of apprentices. Also the study by Funke *et al* (2001) showed that apprentices have a high incidence rate, especially during their first 6 mo. Studies in apprentices reflect a period in life

when many people, in particular those with a constitutional tendency to develop eczema when exposed to skin irritants, have an early onset of hand eczema; consequently a high incidence is found. In some occupations, apprentices get work tasks involving skin irritant exposure, e.g., frequent shampooing in hairdressing apprentices.

Childhood eczema as risk factor for hand eczema has been mentioned in several studies (Nilsson *et al*, 1985; Rystedt, 1985; Lammintausta *et al*, 1991; Coenraads and Diepgen, 1998). In a population-based study of hand eczema, a prevalence ratio of about 3 was found when comparing persons with or without a history of childhood eczema (Meding, 1990). In the present study the influence of atopy on the incidence of hand eczema was obvious, but was restricted mainly to hand eczema cases with onset in the age group 20–29 y (Table III). The pattern was similar for males and females but with higher incidence rates in females of this age group. In the Poisson regression analysis, an association between history of asthma/hay fever and hand eczema was also found for age of hand eczema onset lower than 30 y (Table V).

The questionnaire elicited the year the hand eczema first appeared. Thirty-five percent of the females and 27% of the males reported onset before the age of 20 y and in 63% of these cases a history of childhood eczema was also reported, indicating that hand eczema in atopics tends to start early in life. In a Swedish study of self-reported hand eczema in pupils aged 16–19 y, the overall 1-y prevalence was 10.0%, indicating that many hand eczema cases have an early onset (Yngveson *et al*, 1998). In a similar Danish study of pupils aged 12–16 y, the 1-y prevalence was 7.3% (Mortz *et al*, 2001).

Incidence rates for self-reported hand eczema in the general population were calculated in our retrospective study. The incidence rates are to be considered as representative for an unselected general population and may be useful for comparison when hand eczema incidence is studied in other populations, e.g., different occupational or exposure groups, using a similar study design. Hand eczema occurrence has mostly been investigated in cross-sectional studies, giving the prevalence. Incidence rate is the preferred measure when the causal relation is being studied, e.g., for comparison of hand eczema occurrence in relation to different risk factors (Rothman and Greenland, 1998). Differences in prevalences may be due to differences in duration of disease between groups.

Hand eczema is a long-lasting disease, where a mean duration of 11.6 years from onset to examination was found in a previous Swedish population-based prevalence study (Meding, 1990). The long duration is a problem when comparing prevalence in certain groups, e.g., occupational, as the condition may have started long ago, in other circumstances and exposures than the present ones. Thus in the study mentioned above (Meding, 1990), almost no differences in 1-y prevalences were found between occupational groups, even though clinical experience strongly suggests an increased risk in occupations with high exposure to skin irritants and contact allergens. The advantage of an incidence study in risk evaluation was also illustrated in a study on the occurrence of self-reported hand eczema in bakers (Brisman *et al*, 1998).

To estimate the eczema incidence rate, the time of occurrence must be determined. In the present study we used a retrospective design, which has also been used to study asthma (Brisman and Järvholm, 1995; Järvholm *et al*, 1998; Brisman *et al*, 2000). Some people may forget that they have had hand eczema, and thus the incidence rates may be underestimated. The rates for hand eczema occurring 10–20 y before the examination were about 20% lower than the rates for cases occurring within the 10 y preceding the examination (Table IV). In a Poisson regression analysis, however, the risk estimates were very similar if only cases occurring during the previous 10 y were included (data not shown), indicating that the underreporting does not depend on sex or atopy. If, e.g., persons with atopy more often remembered their eczema than others a bias could be introduced. Such bias would probably be more important for eczema occurring several years ago and the relative risk for atopy would then be higher if also events far ago in time is included in the analysis. Thus, the incidence rate may be underestimated if a long period of occurrence is considered; but if the purpose is to study determinants of risk, e.g., atopy, the relative risk estimates may be unbiased. Our method of estimating incidence rates can be used with little extra effort compared to a cross-sectional design and gives more information about, e.g., risk factors, requiring only that the year of occurrence is noted. The analysis is however, less straightforward than a cross-sectional analysis, as person-years have to be calculated.

It is concluded that incidence rates of self-reported hand eczema in the general population may be estimated using a retrospective study design. The risk of hand eczema in people of working ages was about five cases per 1000 person-years, except in females aged 20–29 y, where the incidence was doubled. This supports the view that environmental factors such as wet exposure, are causing this high incidence of hand eczema in young women. An association between hand eczema and history of childhood eczema as well as asthma/hay fever was observed, but only at ages under 30 y, similarly for males and females. The influence of recall bias on the results must be considered, and also a probable tendency to underreport, implying that the incidence rates presented are to be considered as minimum rates.

Subjects and Methods

Study population A questionnaire was mailed to 3000 individuals aged 20–65 y, randomly selected from the population register in Göteborg in 1996. After three reminders, answers were obtained from 2218 (73.9%), 1088 males, and 1130 females. Of the 782 non-responders two were dead, one could not answer because of illness, 15 had moved abroad, 34 refused to answer and 41 questionnaires were returned without reaching the addressee. The mean age of the responders was 40 y for both males and females.

Questionnaire The questionnaire contained ten questions about hand eczema, atopy history, occupation, and occupational exposure. The main question was: “Have you ever had hand eczema?”, and for affirmative answers the year of onset was asked for. Regarding history of skin atopy the question was: “ Did you have childhood eczema?” For respiratory atopy the questions were: “Have you ever had hay fever?” and “Have you ever had

asthma?" (results presented for asthma and/or hay fever). Results regarding prevalence of hand eczema, occupation and exposure have been presented previously (Meding and Järvholm, 2002).

Statistics Incidences were calculated by the number of new cases of hand eczema per person-year under observation. The person-years were calculated from the year when each individual was 10 y old until 1996 or until the year they developed hand eczema. If hand eczema was reported before the age of 10 y ($n = 31$) or if the starting year of the eczema was unknown ($n = 1$), the subject was excluded from the incidence calculations. Using the Poisson distribution, 95% confidence intervals of the incidence rates were calculated. To study the importance of different determinants, Poisson regression analyses were performed. To compare the difference in cumulative prevalence χ^2 statistics was used. The study was approved by the Ethics Committees of Karolinska Institutet, Stockholm and Göteborg University.

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